WORKING PAPER SERIES

Does Place Really Matter?

Broadband Availability, Race and Income

JC MTI Working Paper - 01

By

Ying Li, Ph.D.

Nicol Turner-Lee, Ph.D.

The Joint Center for Political and Economic Studies

And

Samir Gambhir

Mikyung Baek, Ph.D.

The Ohio State University

April 4, 2011

Does Place Really Matter? Broadband Availability, Race and Income

By Ying Li, Nicol Turner-Lee, Samir Gambhir, and Mikyung Baek

Where a person lives continues to be a reliable predictor of their quality of broadband service. Place is a determinant of not just the availability of high-speed broadband in the home, but also of the likelihood that residents will have access to quality institutions that offer broadband. Having residential or public access to a broadband network at a library or school can affect one's ability to find and apply for a job, research a homework assignment, and even gain access to medical records. People of color, especially those living in low-income areas have historically experienced negative impacts by living in geographically isolated communities that limit their access to social and economic opportunities. Among the poor, only 24 percent with less than a high school education and 40 percent of households with annual income under $20,000 are likely to adopt broadband in America.[1] Not surprisingly, many of these households are within census tracts that are at or below the nation's poverty level.

This working paper assesses new broadband availability data released by the National Telecommunications and Information Administration (NTIA) to address the distribution of broadband wireline and wireless services in low-income, minority communities. As a working paper, it is designed to spur dialogue, and encourage discussion among researchers and other stakeholders in this area. The goal of this paper is twofold: to determine the number of broadband service providers offering high-speed service in low-income and minority areas, and to evaluate the differences in broadband deployment between urban and rural communities. This paper presents three case studies that explores these areas in the state of South Carolina, and the cities of Chicago, IL, and Los Angeles, CA.[2] In each of these locations, we assessed the number of broadband providers by population density, median household income, percentage of non-white population, and percentage of non-white population delineated by African American, Hispanic, and Asian American.[3] In some cases, we added broadband speed as a dependent variable to examine its relationship with service availability in high minority, low-income communities.

---

[1] See John Horrigan, *Broadband Adoption and Use in America 3* (FCC, Omnibus Broadband Initiative, Working Paper Series, No. 1, 2010),http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf.

[2] The Joint Center chose these three distinct regions to represent Midwest, South and West. New York City was originally one of the case studies, but data issues prevented its inclusion in this final report. Future research by the Joint Center proposes to do more national analyses. The time period of the project to meet the delivery of this paper was also a major determinant for the targeted case studies.

[3] All of the maps have been controlled for percentage of non-white population and African American. In the case of Los Angeles, the percentage of Hispanic and Asian American populations by Internet Service Provider (ISP) is offered as part of the analysis.

The dataset is part of the NTIA's new State Broadband Data and Development (SBDD) Program to facilitate the integration of broadband and information technology into state and local economies. Started in 2009, one purpose of the SBDD program is to assist states in gathering data twice a year on the availability, speed, and location of broadband services, as well as broadband availability at community institutions, such as schools, libraries, and hospitals. Data has been used to create a national broadband map covering all 50 states, four territories, Puerto Rico, and the District of Columbia. The data will also help discern the number of broadband service providers offering service, the maximum advertised speeds of those services, and the type of technology used at a census block or street segment level. NTIA's dataset also includes initial data on the broadband services utilized by community anchor institutions such as schools, libraries, and hospitals.

Working with NTIA, the Joint Center for Political and Economic Studies ("Joint Center") conducted preliminary analysis of broadband availability data and specifically explored the relationship between broadband availability, race, and income. The Joint Center is especially interested in the extent to which people of color and lower-income communities have broadband services and infrastructure widely available by measuring the number of broadband service providers by state and municipality. The Joint Center worked directly with the Kirwan Institute for the Study of Race and Ethnicity at The Ohio State University to conduct the analysis and complete the maps presented in this paper.[4]

From our preliminary analysis, the data confirm that broadband service is widely available in all of these regions, but tends to be more aggregated in and around commercial and tourism assets. Moreover, very few cities are without at least one broadband service provider.[5] Such findings are a good indication that high-speed Internet access is more readily available in the United States.

When controlling for race, our analyses did not establish a nexus between any deliberate "redlining" in communities with predominant minority populations in all three regions. In all of these areas, census tracts with high percentages of non-white populations did indeed have at least one Internet Service Provider ("ISP") servicing their community. Disparities, however, were more apparent in the broadband speeds offered in high minority communities, especially those that are low-income. Inglewood, CA, for example, is on the outskirts of metro Los Angeles with a population that is predominantly low-income and African American. Due to the lack of market competition in this area, the broadband service offered is at much lower speeds as compared to other census tracts in downtown Los Angeles or in higher income areas surrounding the city.

Although race was not a significant explanatory variable for disparate broadband deployment in our case studies, we did see some disparities in broadband availability between urban and rural areas regardless of income. In South Carolina, for example, many rural census tracts were without a single ISP as compared to urban areas who had similar median household income but on average had the choice of one to three service providers. Clearly, this finding suggests that market considerations are still huge determinants in deciding where to build or expand robust broadband networks.

---

[4] The Kirwan Institute for the Study of Race and Ethnicity at the Ohio State University partners with people, communities, and institutions to think about, talk about, and engage issues of race and ethnicity in ways that create and expand opportunity for all.

[5] In this first working paper, the Joint Center did not delineate the type of service. In the next working paper, variables referencing distinct wireline or wireless service provision will be controlled.

Finally, our analysis found that despite the availability of mobile broadband in low-income, high minority census tracts in our three case studies, wireless coverage is still somewhat inconsistent within the regions. Although all of the locations have some level of wireless coverage, not all of these areas have achieved mobile broadband access rates of 100 percent per capita. In many cases, the census tracts had multiple providers covering only parts of a geographic footprint. We admit that more work needs to be done to understand the depth of wireless coverage, especially in low-income, high minority communities. We encountered in our analysis several data issues with the wireless source codes that impacted the conclusiveness of our findings. These issues are fully explained in the methodology section.

Does Place Matter?

There has been considerable debate as to whether a person's geographic residence correlates with quality of life. Social science research has long proven how race and place are interconnected in America (Wilson, 1987; Frazier and Tetty-Feo, 2006; Bullard, 2007). In his book *The Black Metropolis in the Twenty-First Century*, Robert D. Bullard (2007) argued that race continues to polarize and spatially divide cities because it establishes perpetual demarcations while offering advantage, privilege, and an "edge" for mainstream groups.

Similar to race, living in poverty defines the current and future experiences of children and families. Residing in impoverished communities often leads to disconnection from and ignorance about vital information that can affect a person's social and economic status. Researchers Greg Duncan and Jeanne Brooks-Gunn (2007) found a significant correlation between poverty and children's health, cognitive development, behavior problems, emotional well being, and school achievement. Children from poor families are 1.7 times more likely to be born with low birth weight, twice as likely to repeat a grade in school and drop out of school, and 3.1 times more likely to have an out of wedlock birth than children from more affluent families.[6]

Place matters when it comes to health. A large body of research in public health demonstrates that location of residence is a powerful predictor of health because of the inequitable distribution of health risks (e.g., environmental degradation, unhealthy foods, crime, and violence) and health-enhancing resources (e.g., access to parks and recreational facilities, healthy foods, health care) across communities.[7] Unfortunately, residential segregation concentrates poverty and disproportionately exposes people of color to health risks. For example, the majority of low-income, unemployed, and less educated African Americans and Hispanics are more likely to live in neighborhoods near illegal waste dumps, and un-remediated land.[8] These health inequities, in turn, create a greater burden on the health care system and economy.[9]

---

[6] See Greg F. Duncan, and Jeanne Brooks-Gunn (2007). Income Effects across the Life Span: Integration and Interpretation." In *Consequences of Growing Up Poor,* ed. Greg J. Duncan and Jeanne Brooks-Gunn. New York: Russell Sage.

[7] The Joint Center Health Policy Institute and PolicyLink. (2004). *Building Strong Communities for Better Health*. Washington, DC: The Joint Center for Political and Economic Studies.

[8] The Associated Press (2007). More Blacks Live with Pollution. In Paula S. Rothenberg, *Race, Class and Gender in the United States* (7th edition). New York, NY: Worth Publishers.

[9] Thomas LaVeist, Gaskin, Darrell, and Patrick Richard. (2009). *The Economic Burden of Health Inequalities in the United States*. Washington, DC: The Joint Center for Political and Economic Studies.

In November 2010, the Commerce Department offered a similar finding around broadband availability, adoption and race in their report, *Exploring the Digital Nation: Home Broadband Internet Adoption in the United States*. Based on a survey of approximately 54,000 households conducted in October 2009, the largest sample currently available on U.S. broadband Internet adoption, researchers concluded that income and education levels, although strongly associated with broadband Internet use, are not the sole determinants of broadband Internet adoption by households. Race, ethnicity, and geography are significant factors as well (See Table 1).

TABLE 1

Broadband Unavailability as a Main Reason for Non-Adoption of Home Broadband Internet by Race and Ethnicity *(% households*)

	All	White	Black	Hispanic
Internet non-users	0.7	0.7	0.4	0.5
Households using the Internet outside of home	2.7	3.8	1.2	0.9
Households with dial-up Internet access	19.9	23.3	13.5	6.2

Source: U.S. Census Bureau, Current Population Survey, October 2009

Research by the Federal Communications Commission, Pew Research Center, and the Joint Center for Political and Economic Studies also confirm the disparities in broadband adoption among racial and ethnic groups, and between urban and rural areas.[10]

According to the Joint Center's research on national minority broadband adoption (2010), more minority groups – especially more affluent and educated African Americans and Hispanics - are getting online.[11] Yet, income, education, and age disparities persist.

- Fifty percent of African Americans and 43 percent of Hispanics earning less than $20,000 a year reported being online when compared to 91 percent and 89 percent of African Americans and Hispanics earning more than $50,000 annually.
- Fifty one percent of Whites who dropped out of high school report Internet use, while 37 percent of African Americans and 33 percent of Hispanics with less than a high school diploma regularly use the Internet.

[10] See John Horrigan, *Broadband Adoption and Use in America 3* (FCC, Omnibus Broadband Initiative, Working Paper Series, No. 1, 2010),http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf. See findings from Jon P. Gant, Nicol Turner-Lee, Ying Li, and Joseph Miller. February 2010. *National Minority Broadband Adoption: Comparative Trends in Adoption, Acceptance and Use*. Washington, DC: Joint Center for Political and Economic Studies.

[11] See findings from Jon P. Gant, Nicol Turner-Lee, Ying Li, and Joseph Miller. February 2010. *National Minority Broadband Adoption: Comparative Trends in Adoption, Acceptance and Use*. Washington, DC: Joint Center for Political and Economic Studies.

- Seventeen percent of Hispanics and 15 percent of African Americans 65 years of age and older have a home broadband connection.

One's geography also influenced the rate of broadband adoption. According to the NTIA's study (November 2010), rural households were more likely to report broadband unavailability as the main reason for their non-use (Table 2). Research by the Joint Center found this finding to be particularly true for Hispanics. Hispanics from rural communities had the lowest rate of broadband adoption (47 percent) when compared to those Hispanics from urban areas (61 percent).

TABLE 2

Broadband Unavailability as a Main Reason for Non-Adoption of Home Broadband Internet by Metropolitan Status *(% households*)

	All	Urban	Rural
Internet non-users	0.7	0.5	1.1
Households using the Internet outside of home	2.7	2.1	5.0
Households with dial-up Internet access	19.9	14.7	36.1

Source: U.S. Census Bureau, Current Population Survey, October 2009

In addition to these demographic variables, other factors that include disinterest, accessibility, and the cost of broadband service were also reported as critical barriers to adoption. Trending with other national broadband research studies, the Joint Center's survey found that more than 40 percent of African Americans and Hispanics were simply not interested in broadband service. Among non-adopters, our research concluded that:

- Sixteen percent of Hispanic non-adopters and 13 percent of African American non-adopters reported not having access to broadband as the reasons for their disengagement.
- Eleven percent of both Hispanic and African American non-adopters said that broadband was too expensive.

What this data suggests is that broadband availability is key, but not critical, to accelerating adoption among the poor and minorities. However, as noted by the researchers at the Commerce Department, one should exercise caution in reviewing consumer-reported availability data. For example, a lack of general awareness of the availability of broadband in a geographic area may play a significant role in the extent to which survey respondents perceive the relevance of broadband.

Indeed, the Joint Center's national minority broadband adoption study showed an overwhelming majority of non-Internet users (70 percent) and more than a third of Internet users (36 percent) did not know if high-speed Internet was even being offered in their neighborhoods (See Table 3).

TABLE 3

People's Awareness of Numbers of Companies Offering Broadband Internet in the Neighborhood by Internet Use

Number of Providers	Internet user (%)	Non-Internet user (%)
None	2	3
1	7	5
2	21	8
3	18	7
4+	15	7
Don't know	36	70

Source: Joint Center for Political and Economic Studies, National Minority Broadband Adoption: Comparative Trends in Adoption, Acceptance and Use Survey, December 2009- January 2010

As previously discussed, equity issues in the U.S. have a geographic footprint. Be it education, health, or socio-economic factors, social and racial inequity follows spatial pattern of racial segregation. Research completed by the Pew American and Internet Life Project (2010) shared that African-Americans and English-speaking Latinos were significantly more likely than whites to say that a lack of broadband access is a "major disadvantage" when it comes to finding out about job opportunities; getting health information; learning new things to improve or enrich one's life; using government services; and keeping up with local community happenings. When asked whether expanding high speed access to everyone in the country should be a priority of the federal government, minorities (48 percent of blacks and 43 percent of English-speaking Latinos) were also more likely to say that it should be a top priority or that it is important but a lower priority than whites (39 percent).

With this background in mind, this paper brings to scholars and policy makers data that addresses two important issues: (1) the extent to which broadband is readily available in low-income communities, especially those where minorities are more concentrated; and, (2) the degree to which urban and rural penetration rates show dramatic difference in broadband service deployment. The answers to these issues shed light on the important role of infrastructure in narrowing disparities in digital access and, as a whole, the information economy. The findings also affirm why broadband adoption continues to be a pressing concern for these groups even when wireline or wireless services are available in their community.

Methodology

In order to understand the spatial pattern of broadband access for marginalized communities, the Joint Center, in partnership with the Kirwan Institute for the Study of Race and Ethnicity ("Kirwan Institute") at The Ohio State University, mapped broadband availability in selected metros and towns in the nation in relation to race and income.

As part of the project, NTIA data was re-coded, and visual maps were created to reflect the findings. In the initial phase of this project, we mapped five metropolitan areas (Los Angeles, New York, Chicago, Houston, and Washington, DC) and two rural areas (Gunnison Town, MS and Bucksport, SC). We chose five metropolitan areas with large and diverse populations to compare broadband coverage among areas with different concentrations of racial and ethnic minorities. We also intended to compare availability in major cities with coverage in suburban and surrounding rural areas. Table 4 offers a demographic comparison of the initial cities of interest.

TABLE 4
Rank of Large Metro Areas by Minority Populations

Metro Area	Black	Hispanic	Asian
Los Angeles	9	1	1
New York	1	2	2
Chicago	3	5	5
Houston	8	4	9
Washington, DC	4	N/A	7

Source: Brookings Institution

As shown in Table 4, all chosen metro areas except Washington DC ranked high for minority populations. Due to difficulties in data coding, the cities of Los Angeles, CA and Chicago, IL were chosen for the final case studies. These cities were much easier to extract information and overlay with census tract data.

To capture rural diversity, we began with a map of two small towns in the states of South Carolina and Mississippi with high concentration of African Americans and low income populations, but later chose to focus on the entire State of South Carolina. South Carolina maps were then broken down by the northern and southern regions to ensure readability of results.

NTIA Datasets

The datasets with broadband service data provided by NTIA contain rich information on providers, subscribers, and Community Anchor Institutions (CAI). It includes providers' names and the census blocks they serve, subscribers categories (residential, institutional, and businesses) as end users for these providers by census block, and geographic location of CAIs. Detailed information on wireless and wireline access, and broadband speed is also included in these datasets.

We encountered challenges working with end users' data, as the census block ID was missing from the dataset, which made it impossible to locate end users geographically. We decided to use providers' data as a proxy for broadband access. We aggregated the data to calculate number of providers by each census tract. A higher number of providers suggests higher access and vice versa. We mapped this data

by census tract against tract-based demographic information on race and income from ESRI's (Environmental Systems Research Institute) 2010 estimates. A full list of broadband service providers for each area is included in Appendix B.

'BB_Service_Censusblock' dataset contained nearly 13 million records on broadband providers by census block for each state. Data for Illinois, Indiana, Wisconsin, California, and South Carolina was extracted from this dataset (using SPSS®) as our mapping and analysis focused on Chicago MSA, Los Angeles MSA, and the State of South Carolina. Data was aggregated by census tracts, our unit of analysis, for each of these metropolitan areas to determine the number of broadband providers. This data was represented on the map as dots with varying sizes depending on the number of providers – the higher the number, the bigger the dot. This dataset also provides block group and census block number to facilitate analysis by census block group and by census block as well.

A number of challenges were encountered when cleaning up working with the dataset:

- The national dataset was rather large, and it was time and resource intensive to extract data for each State.
- Since the data was for each census block, in order to get the number of broadband providers by census tract, data was aggregated after removing duplicate entries for each tract. A less time-intensive approach could have been availability of datasets for each census geography in the region.
- A number of census block IDs were inconsistent with the outcome of concatenating State, County, Tract, Block group, and census block IDs.

As mentioned, we hypothesized that areas with higher concentrations of minority communities will have fewer broadband providers. We mapped the number of providers over race and income data to determine any spatial pattern that might support our hypothesis.

We did remain open to the fact that using the number of providers as a proxy for broadband access may or may not support our hypotheses. Though it is a good indicator for our analysis due to lack of any direct measure of broadband access, a higher number might correlate well with commercial land use such as a business district or downtown area. Our future research with more detailed analysis of broadband speed and the type of broadband service offered by these providers might also provide a more granular analysis of intersection of access and race. And a more thorough analysis of the location of the CAIs might also be undertaken regarding how low-income, minority communities utilize public access facilities when a residential connection is not available.

Working with the wireless data was a bit more challenging. In the coding process, we worked on our maps based on the original data we downloaded (when the data was not public). The data we extracted for LA and Chicago metros had wireline as well as wireless providers listed by a code labeled 'TRANSTECH'. This variable made it easier to extract wireless services.

South Carolina, however, has many inconsistencies. In our first run, for example, South Carolina data extracted from the same file did not show any wireless providers. When the NTIA data became public, we then extracted South Carolina data to compare with the original dataset. The public dataset had a separate file for wireless providers for the state. The wireline data was not much different from the original data. However, the wireless providers' data was extracted from a GIS coverage shapefile

(mentioned on 'readme' file). Coverage for each provider for each block was expressed as a percentage of area covered. To understand this better, imagine a flood map showing only 25 percent of an area covered by water. Likewise our data had as low as 0.0001 percent of a block covered by a wireless provider. Since it was hard to determine a cut-off level where a block might be considered covered (e.g. 25 percent or 50 percent or any other value), we considered this as a data issue in our analysis for South Carolina. In South Carolina, out of approximately 786,000 records, approximately 62,500 records show less than 100 percent coverage for providers by block. In addition, approximately 13,000 records show less than 25 percent coverage.

Moving forward, this data can either be provided in a GIS shapefile whereby researchers can use some criteria to define coverage, or NTIA can determine the threshold to make it a binary variable. We suspect that NTIA analysts attributed *x* percent of the population receiving wireless coverage where *x* is the percentage of wireless coverage for each block when the reported statewide analysis. Another option would be to include only those blocks which have 100 percent coverage for any provider. Although this could be a potential problem if one provider has 100 percent coverage while another has a very low percentage cover.

To ensure that wireless coverage was adequately represented, we did include cities and counties in the case studies by the number of wireless service providers, regardless of coverage depth. Much of that data was pulled from the public NTIA interface.

To determine the degree and power of mapping broadband service availability in relation with demographic data, Ordinary Least Squares (OLS) Regression analyses were run in South Carolina, especially since broadband availability was uneven throughout the state, and Inglewood, CA which illustrated a possible level of race and income disparity. This regression method performs linear regression to model a dependent variable (broadband access) in terms of its relationships to a set of explanatory variables[12] (demographic variables such as race, income). OLS analyses were not run in metro Los Angeles or Chicago due to time constraints on the project.

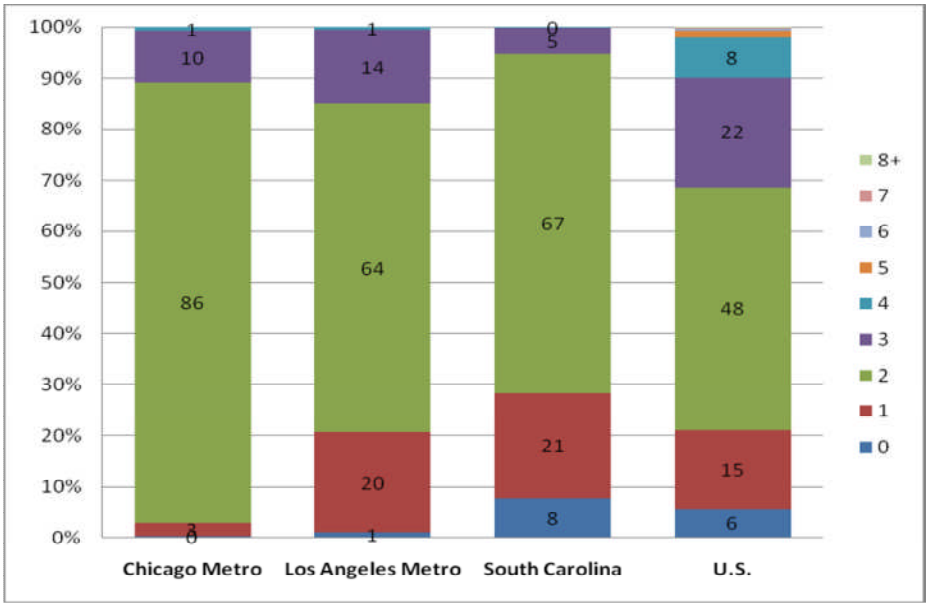
Discussion of Findings

The data from all three case studies confirm that broadband service is widely available in all of these regions, especially in and around commercial and tourism centers. Very few cities were without at least one broadband service provider.

As shown in Figures 1 and 2 and Appendix A, nationwide, about half (48 percent) of the population live in areas with two wireline providers; about two thirds of residents in South Carolina and Los Angeles Metro have the choice of two wireline providers as compared to an overwhelming majority (86 percent) of Chicago residents. Disparity between regions is more salient when it comes to wireless connection.

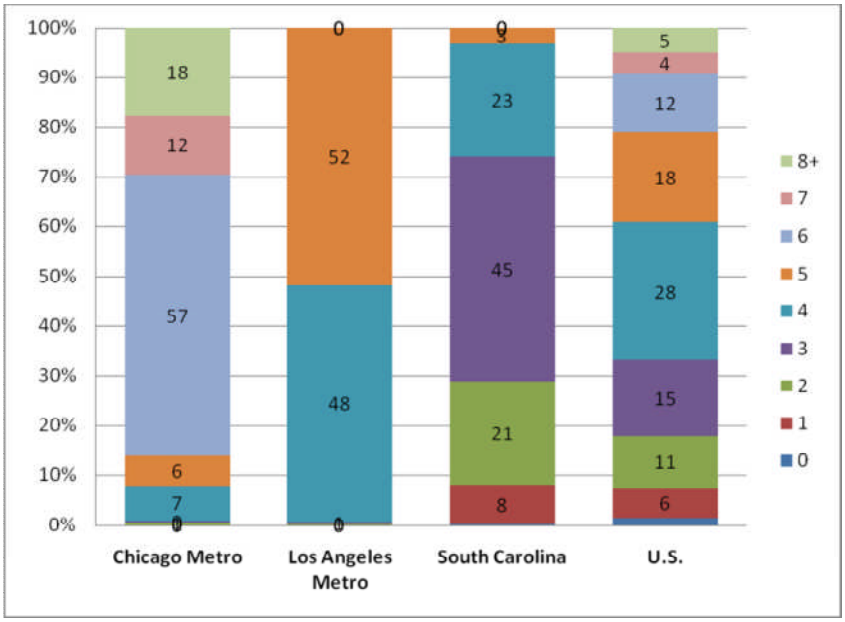
[12] Definition from Environmental Systems Research Institute's (ESRI) ArcGIS Resource Center

FIGURE 1
Percentage of People Living in Areas with Wireline Providers



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 2
Percentage of People Living in Areas with Wireless Providers



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

More than half (57 percent) of Chicago residents live in areas with six wireless providers; Los Angeles residents are evenly distributed between four and five wireless providers; 45 percent of residents in South Carolina have the choice of three wireless providers.

When controlling for race, census tracts with high percentages of non-white populations did indeed have at least one ISP servicing their community in all three regions. Disparities were more apparent in the broadband speed offered in high minority, low-income communities. Select lower income census tracts, regardless of racial and/or ethnic composition, also revealed some levels of disparities in broadband availability in our case studies.

Finally, our analyses also found that despite the high use of wireless coverage by low-income, high minority census tracts in our three case studies, our locations did not have 100 percent coverage by one single service provider which might impact service availability for consumers that are heavily dependent on mobile broadband for access.

The State of South Carolina

South Carolina is one of the poorest states in the country. Its median household income in 2009 was $42,442, well below the national average of $50,221. The State also has a large rural population; over 40 percent of residents live in rural areas, almost twice the national average of 23 percent. Like other southern states, African Americans account for a higher percentage of the total population. Because of its large low-income, rural and black populations, we considered South Carolina an ideal state to examine the relationship among race, place and broadband availability. Appendix A offers background data from the American Community Survey (ACS) on South Carolina's demography as well as the number of broadband providers from the NTIA. Names of service providers are included in Appendix B.

As part of the project, we produced three sets of maps for South Carolina: state wide, northern part of the state, and southern part of the state (Appendix C). Each map displays the number of broadband providers (red dots) overlaid on population density, median household income, non-white population, or black population.

The maps for the *entire state* of South Carolina are labeled as:

- *SC1: Broadband Access and Population Density*
- *SC2: Broadband Access and Median Household Income*
- *SC3: Broadband Access and Non-White Population*
- *SC4: Broadband Access and African American Population*

The maps for the *northern part* of South Carolina are labeled as:

- *SC-N1: Broadband Access and Population Density*
- *SC-N2: Broadband Access and Median Household Income*
- *SC-N3: Broadband Access and Non-White Population*
- *SC-N4: Broadband Access and African American Population*

The maps for the *southern part* of South Carolina are labeled as:

- *SC-S1: Broadband Access and Population Density*
- *SC-S2: Broadband Access and Median Household Income*
- *SC-S3: Broadband Access and Non-White Population*
- *SC-S4: Broadband Access and African American Population*

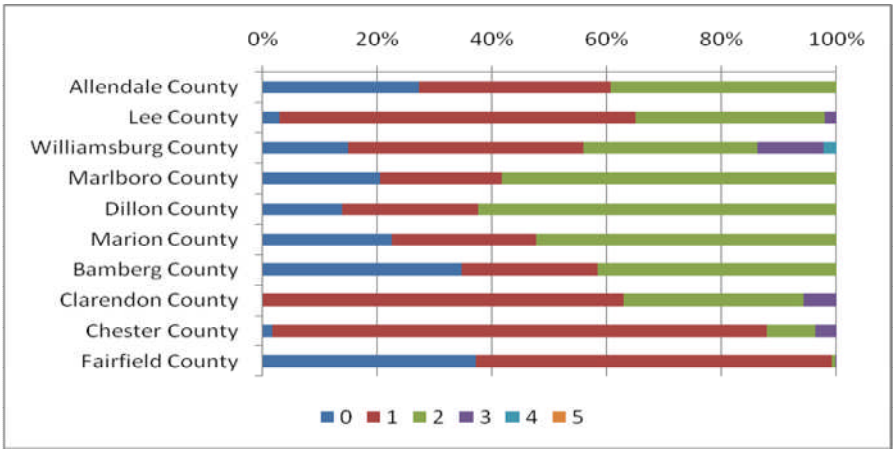
In the State of South Carolina, these maps visually illustrate that place matters. Overall, broadband services tend to be more abundant around urban areas (e.g., Charleston, Columbia, Spartanburg, Lexington and Greenville) and tourist cities along the coast (e.g., Myrtle Beach). Service by racial concentration was not an overly significant factor in South Carolina based upon the widespread lack of broadband service providers in its more rural cities and communities, irrespective of the percentage of the non-white population. Income, therefore, was a more explanatory factor.

Place, Income, and ISP Choices

The scarcity of broadband service did appear in the more rural areas between northern and southern parts of the State, especially those census tracts where the median income is below $60,000. In many instances, population density estimates could attribute to the lower numbers of service providers in certain communities.

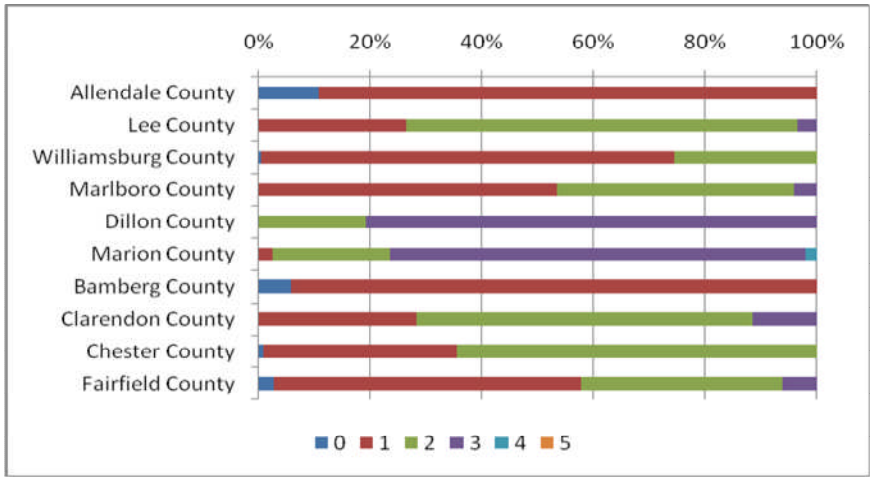
At the county level, we found that people in the counties with the lowest median household income have fewer choices of both wireline and wireless providers than people in counties with the highest median household income (see Figures 3-6). At this time, people in poor counties are also more likely to have one or no wireline providers while people in wealthier counties are mostly living in areas with at least two wireline providers. People in affluent areas have also more choices of wireless service providers.

FIGURE 3
Percent of People Living in Areas with Wireline Providers in the Top 10 Poorest Counties in South Carolina



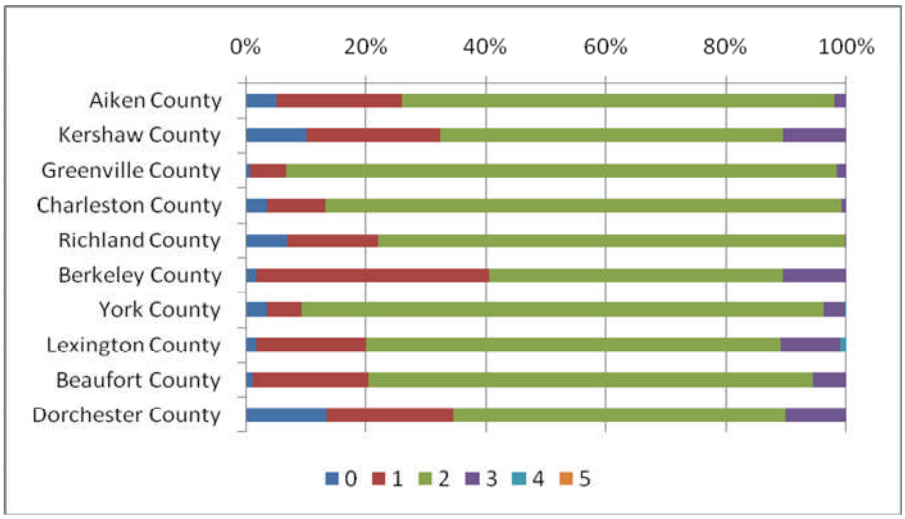
Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 4
Percent of People Living in Areas with Wireless Providers in the Top 10 Poorest Counties in South Carolina



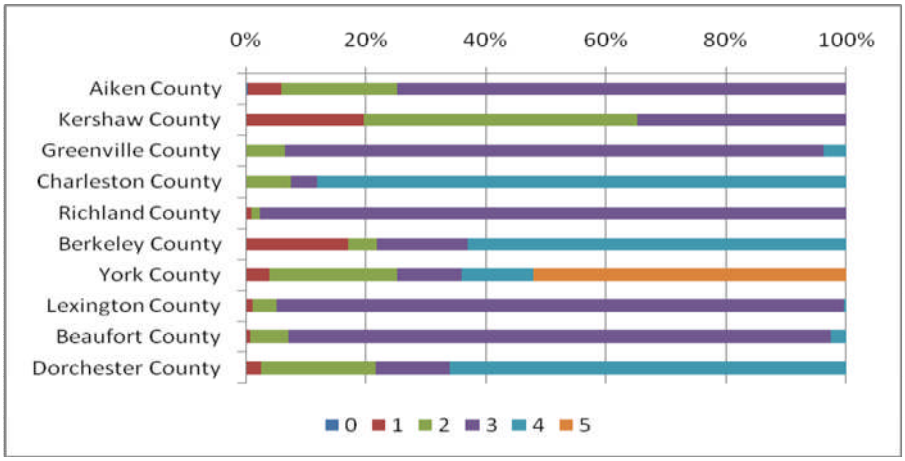
Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 5
Percent of People Living in Areas with Wireline Providers in the Top 10 Wealthiest Counties in South Carolina



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 6
Percent of People Living in Areas with Wireless Providers in the Top 10 Wealthiest Counties in South Carolina



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

Ordinary Least Square (OLS) regression analyses were conducted on data from South Carolina[13] on broadband providers with race and income as explanatory variables. It was hypothesized that the number of broadband providers would have a negative relationship with race (percentage of non-white population) and a positive relationship with income. The result showed that while these relationships were significant, the coefficient of regression is very low (Adjusted R-Squared = 0.0388). In other words, race and income combined explains merely 4 percent of variability in broadband availability.

This finding suggests that the original model might need more variables to increase the explanatory power. Considering that there might be differences in geographic broadband availability, urban areas were added as a control for the model. Subsequently, population density and wireline providers per capita were also added as additional explanatory variables. The results from the revised models were not significantly better than the original model, mostly showing even lower Adjusted R-square results. Some of the models that had relatively better regression coefficients were also rejected as those models either reduced the significance of some of the control variables or resulted in counter-intuitive directionality. Appendix D lists the OLS results.

For a more in-depth study on the role of space in analyzing broadband providers with respect to race and income in South Carolina, Geographic Weighted Regression (GWR) analysis can prove to be an excellent tool. GWR is a spatial regression technique and provides a local model of the variable under study by fitting a regression equation to explanatory variables in space.[14] GWR can provide spatial analysis for each census tract in South Carolina based on broadband, race, and income data, which was not conducted at this point for the project.

[13] OLS regression analysis was conducted for Inglewood, CA as well. Though the maps display spatial correlation visually, the OLS results were inconclusive due to small sample size.
[14] Definition from ESRI ArcGIS Resource Center

The City of Los Angeles and Surrounding Areas

Los Angeles, CA (LA) can be described as a majority-minority city; only a third of it is population are whites. It is the second largest city in the United States. Similar to New York, Los Angeles has large Asian and Hispanic populations. Unlike New York, however, LA doesn't have a high concentration of blacks. The LA metropolitan area is composed of disparate communities ranging from South Gate city with 95 percent of its residents Hispanic, to Cerritos city with 60 percent Asian residents. Yorba Linda city has a median household income of $114,332, while Compton city has a median of $41,890. All these unique characteristics of LA make it an interesting city in which to study the dynamics of broadband, race and place. Appendix A provides more detail on LA's demographic diversity by the number of reported broadband service providers. Appendix B lists the names of the service providers.

As part of the project, we produced six maps for the LA metro area: the number of broadband providers overlaid on population density, median household income, non-white, African American, Hispanic, and Asian populations (Appendix C).

The maps for Los Angeles Metro areas are labeled as:

- *LA1: Broadband Access and Population Density*
- *LA2: Broadband Access and Median Household Income*
- *LA3: Broadband Access and Non-White Population*
- *LA4: Broadband Access and African American Population*
- *LA5: Broadband Access and Hispanic Population*
- *LA6: Broadband Access and Asian Population*

As shown in the maps, broadband services appear to be more concentrated around LA's downtown area - the Westside and Beverly Hills, and Santa Monica. This finding makes sense since many of the surrounding LA communities have lower population counts, or consist of mountainous regions. In this case, therefore, broadband availability does not seem to correlate highly with the location of racial and ethnic groups. Hispanics and Asians because they are less concentrated and more dispersed tend to have access to three or more broadband service providers where they live. Whereas, African Americans who tend to live in more concentrated communities like Inglewood have the fewest choices of broadband service providers as compared to Asians and Hispanics.

Place, Income, and ISP Choices

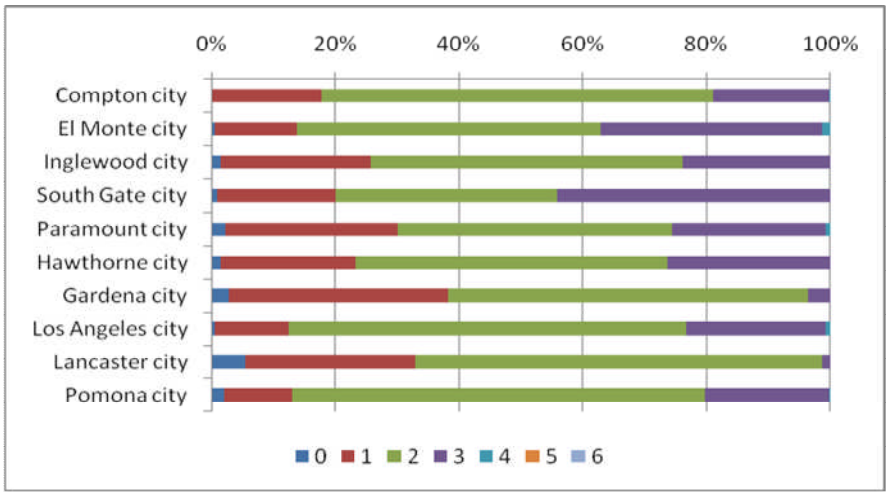
We ran OLS regression analysis for the census tracts in Inglewood, where 43 percent of residents are African Americans and the median household income ($42,235) is one of the lowest in the LA metro. The Adjusted R-Square was 0.1145, i.e., race and income could explain 11.45 percent of the variability of the number of providers in the model. When we added census tracts surrounding Inglewood to the model, the R-Square declined to 0.021128. Clearly, in both of the above models, other activity is causing the effect, and additional controls are needed to better understand the results.

Inglewood also revealed an interesting finding around broadband speed. The map in Appendix E shares speed data for Inglewood as compared to the greater Los Angeles metro area. Overall, 3.01 to 25mbps are currently being offered to residents, a speed that is lower than the predominant offerings in higher

income communities in and around LA metro. Whether or not this finding is in other cities with similar demographics should be further explored.

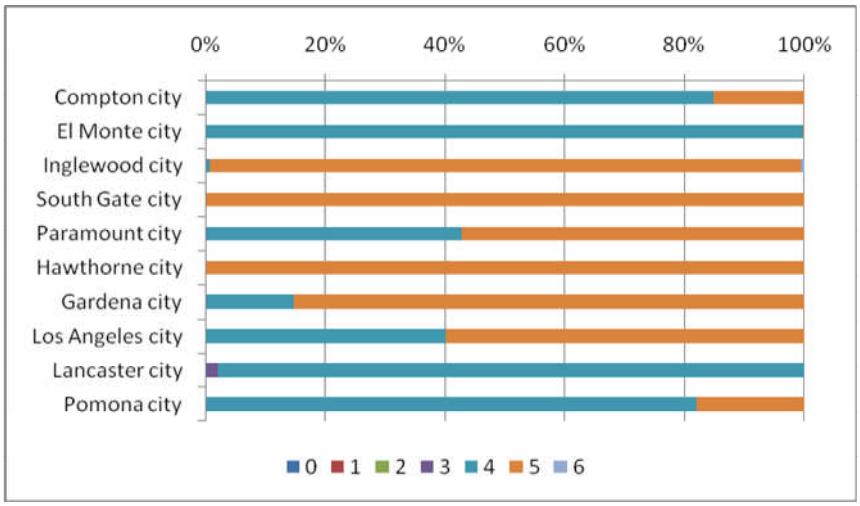
Despite the Inglewood finding, we did find that at the city level, residents in the cities surrounding Los Angeles with the lowest median household income have more choices of providers than people in cities with the highest median household income (see Figures 7-10). This is probably because of the terrain conditions of the far suburban areas of LA Metro, and fewer commercial assets in those areas.

FIGURE 7
Percent of People Living in Areas with Wireline Providers in the Top 10 Poorest Cities in Los Angeles Metro



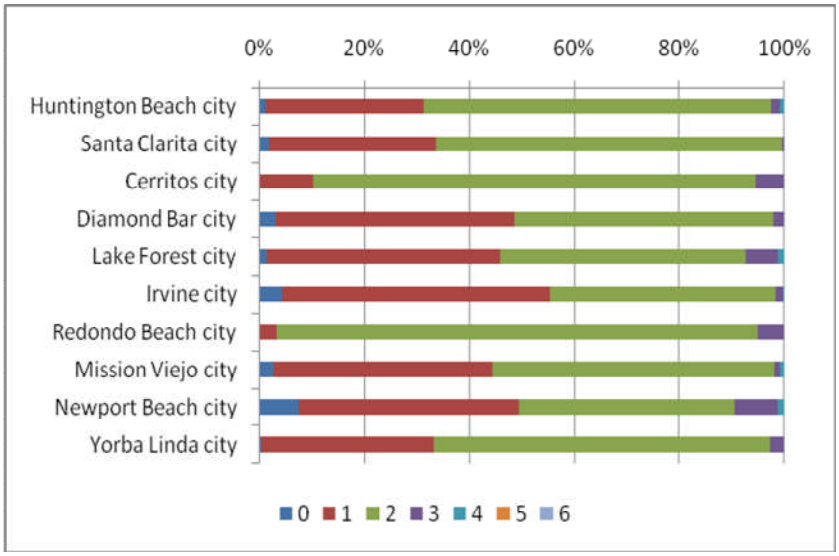
Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 8
Percent of People Living in Areas with Wireless Providers in the Top 10 Poorest Cities in Los Angeles Metro



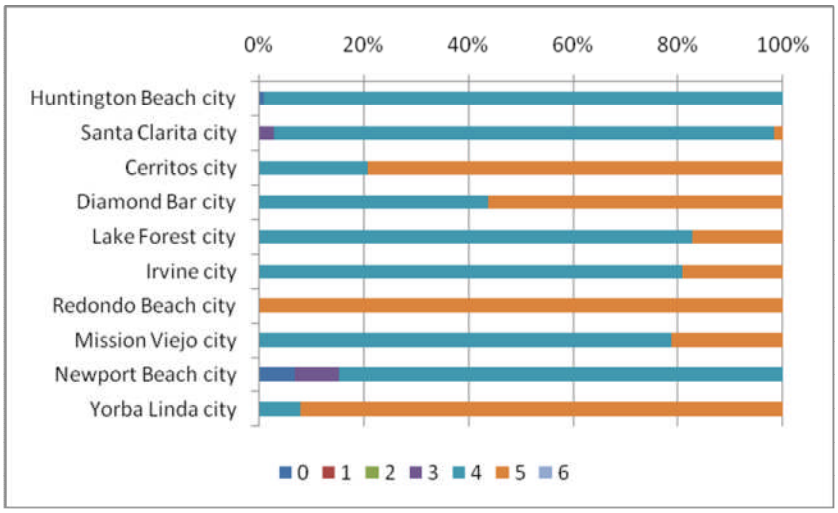
Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 9
Percent of People Living in Areas with Wireline Providers in the Top 10 Wealthiest Cities in Los Angeles Metro



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

FIGURE 10
Percent of People Living in Areas with Wireless Providers in the Top 10 Wealthiest Cities in Los Angeles Metro



Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

Chicago Metropolitan and Surrounding Areas

Chicago, IL, the final case study for this working paper, is the third largest city in United States. What makes Chicago unique is that the city has almost equal numbers of whites, African Americans and Hispanics. While the city also has a median income lower than the national average, it is surrounded by cities and communities with higher incomes, as shown in Appendix A. Chicago's Asian population is also close to that of the national average.

We produced two sets of maps for Chicago metro area: 1) the first set groups the number of broadband providers into 1-3 providers, 4-5 providers, and 6-11 providers (CH Map "A" Series) ; 2) the second set has groups 1 provider, 2 providers, 3 providers, and more than 3 providers (CH Map "B" Series). All maps are in Appendix C. Each map displays the number of providers overlaid on population density, median household income, non-white, or African American populations. Because Chicago appears to have ubiquitous access and perhaps some type of ceiling on the number of service providers within the metro area, we experimented with the provider categories to see if the maps look significantly different when run by the variables of population density, and percentage of non-white population.

The CH Map "A" Series for the larger range of service providers for the Chicago metro area are labeled as:

- *CH A1: Broadband Access and Population Density*
- *CH A2: Broadband Access and Median Household Income*
- *CH A3: Broadband Access and Non-White Population*
- *CH A4: Broadband Access and African American Population*

The CH Map "B" Series for the smaller range of service providers for the Chicago metro area are labeled as:

- *CH B1: Broadband Access and Population Density*
- *CH B2: Broadband Access and Median Household Income*
- *CH B3: Broadband Access and Non-White Population*
- *CH B4: Broadband Access and African American Population*

From a review of the maps, we found that when the variable of the number of service providers were revised (Map "B" Series), some differences did emerge. Compared to "A" Series, "B" Series shows that, like South Carolina and LA, Chicago's downtown area has more choices of broadband providers than some of its surrounding communities and suburbs. Unlike LA, Chicago's highly dense African American and Hispanic populations have equitable coverage, yet their choice of providers was more likely to be one service provider when compared to commercial areas. While race and income do not appear to correlate significantly with broadband availability, a discussion around choices would be a fruitful one for these non-white, low-income residents.

Another interesting finding from the Chicago case is that Cook County's neighbor Lake County in Indiana has far more choices of broadband providers. This finding may reflect regulatory differences on broadband service between states and needs further research and policy analysis.

Place, Income, and ISP Choices

In the Chicago metro area, the numbers of broadband providers do not differ significantly between people in low-income areas and people in wealthier neighborhoods. Unlike residents in Los Angeles and South Carolina, wireless availability is much more robust in Chicago (See Tables 5 and 6 in Appendix A).

Going Forward

While more research needs to be done to test the correlation between broadband availability, race, and income nationally, the initial data presented in this working paper suggest that in South Carolina highly concentrated rural communities experiences broadband service provider scarcity. In this state and perhaps other similar ones, it is imperative that policy makers establish narrowly-tailored incentives that drive broadband deployment in isolated areas. While this is not a new finding in broadband research, the maps clearly point to a persistent digital gap that is leaving these communities behind.

As mentioned, this paper does not purport to establish a nexus between any deliberate "redlining" and resulting disparities. In fact, the three case studies we reviewed here suggest that nominal broadband service is available in communities with high minority populations, even if offered at lower speeds.

What is more interesting, however, is the extent to which service availability does not necessarily translate into greater rates of broadband subscription. Because the maps primarily expose where service is, more research needs to be done on why these populations still do not adopt broadband at higher rates, an affirmation that adoption is still a major challenge.

Going forward, areas of additional research should focus on:

- Cost. The extent to which the cost of broadband services remains a prohibitive factor to adoption should be studied alongside the SBDD data. Because the price of service was not included in the NTIA dataset, it was difficult to disentangle this effect. More complex statistical analyses and comparisons with other datasets would surface some interesting findings, and help the market understand how to align build out with appropriate cost structures that increase take up rates in low-income, high minority communities.

- Type. The types of broadband service that are more prevalent and widely used in predominantly non-white communities would also yield more robust conclusions. Recent research has shown that racial and ethnic minorities have different patterns of use with respect to wireline versus wireless broadband. For example, a recent Nielsen survey shows that nearly a third (31 percent) of all mobile consumers in the United States owned smartphones, i.e., cell phones with app-based, web-enabled operating systems. But smartphone penetration is even higher among minority mobile users - Asian/Pacific Islanders (45 percent), Hispanics (45 percent) and African-Americans (33 percent). These compare to only 27 percent of White mobile users reported owning a smartphone. Addressing the apparent data issue for reporting wireless coverage in the dataset, and understanding better how wireless coverage is mapping compared to wireline would be interesting, especially in communities with high minority populations. Within the report, our analysis has been somewhat high level with its focus on cities and counties within our case study regions. Conducting more granular analysis of wireless penetration at the block and/or census tract level would yield interesting more findings about the depth and consistency of wireless availability in these communities.

- Speed. The finding in Inglewood, CA does lend itself to further exploration, especially a discovery of whether or not speed disparities play out in lower income, high minority populations. This variable also speaks to the depth of competition of broadband services in low-income, high minority communities. Going forward, the research team will examine this variable across the country to determine if a trend exists due to fewer competitors in these markets.

In addition to these areas, the data in these maps also offer insight into where broadband networks get deployed in states. Geographical considerations for broadband deployment should correlate directly with where the jobless members of our population are concentrated, and not just in locations with commercial and tourist assets. Communities that lack industries with high rates of job growth will uniformly show higher unemployment rates. Place is a critical component of a state's economic development strategy.

As states strive to improve the economic potential for their citizens – whether through new industry development, job creation, and improved connections to regional and global economies, disparities in broadband service availability and income must be addressed. Individuals that live within communities with a poor digital infrastructure will continue to live within places that offer little to no promise for individual improvement or connection to the economic mainstream.

References

The Associated Press (2007). More Blacks Live with Pollution. In Paula S. Rothenberg, Race, Class, and Gender in the United States (7th ed.). New York, NY: Worth Publishers.

Bullard, Robert D. (2007). The Black Metropolis in the Twenty-First Century: Race, Power, and Politics of Place. Lanham, MD: Rowman & Littlefield Publishing Group, Inc.

Duncan, Greg J., and Jeanne Brooks-Gunn. (1997). "Income Effects across the Life Span: Integration and Interpretation." In *Consequences of Growing Up Poor,* ed. Greg J. Duncan and Jeanne Brooks-Gunn. New York: Russell Sage.

Economics and Statistics Administration , and National Telecommunications and Information Administration (2010). Exploring the Digital Nation: Home Broadband Internet Adoption in the United States. Washington, DC: U.S. Department of Commerce.

Frazier, John W. and Eugene L. Tetty-Fio (2006). Race, Ethnicity and Place in a Changing America. Binghamton, NY: Global Publishing.

Gant, Jon P., Nicol E. Turner-Lee, Ying Li, and Joseph S. Miller (2010). National Minority Broadband Adoption: Comparative Trends in Adoption, Acceptance and Use. Washington, DC: Joint Center for Political and Economic Studies.

Horrigan, John B. (2010). Broadband Adoption and Use in America: OBI Working Paper Series No. 1. Washington, DC: Federal Communications Commission.

The Joint Center Health Policy Institute and PolicyLink. (2004). Building Strong Communities for Better Health. Washington, DC: The Joint Center for Political and Economic Studies.

Kellogg, Don (2011). Among Mobile Phone Users, Hispanics, Asians are Most-Likely Smartphone Owners in the U.S. The Nielsen Company.

Thomas LaVeist, Gaskin, Darrell, and Patrick Richard. (2009). The Economic Burden of Health Inequalities in the United States. Washington, DC: The Joint Center for Political and Economic Studies.

Metropolitan Policy Program (2010). State of Metropolitan America on the Front Lines of Demographic Transformation. Washington, DC: Brookings Institution.

Smith, Aaron (2010). Home Broadband 2010. Washington, DC: Pew Research Center's Internet & American Life Project.

Wilson, William J. (1987). The Truly Disadvantaged. Chicago: University of Chicago Press.

About the Authors

YING LI, PH.D., RESEARCH ANALYST, JOINT CENTER FOR POLITICAL AND ECONOMIC STUDIES

Dr. Ying Li is a Research Analyst at the Joint Center for Political and Economic Studies. Her research focuses on national public policies that affect the wellbeing of racial and ethnic minorities. She also works closely with the U.S. Census Bureau to promote the 2010 Census and other surveys and to disseminate Census data to underserved communities. Dr. Li has conducted policy research in the fields of education, employment, health, housing, justice, technology, voting and demographic trends by analyzing national telephone surveys as well as large datasets from the Census Bureau, Bureau of Labor Statistics, National Center for Education Statistics, National Center for Health Statistics, Bureau of Justice Statistics and other federal agencies. In addition, she conducts program evaluations in the field of media and technology. Dr. Li is the primary staff person at the Joint Center to work with the Census Bureau to disseminate census data to communities of color in easily understandable formats. She has served on the Steering Committee of the Census Information Center (CIC) Program since 2008. The CIC Program is a cooperative venture between the Census Bureau and national-level, community-based organizations and colleges and universities to serve as auxiliary data distribution centers reaching underserved populations. As a Steering Committee member, she assists and provides guidance to the Census Bureau to meet and improve the program goals. Dr. Li received her Ph.D. in mass communication and media arts from Southern Illinois University, and her master's and bachelor's degrees in library and information science from Peking University, China.

NICOL TURNER-LEE, PH.D., VICE PRESIDENT AND DIRECTOR, MEDIA AND TECHNOLOGY INSTITUTE

Dr. Turner-Lee is Vice President and the first Director of the Media and Technology Institute for the Joint Center for Political and Economic Studies. The Media and Technology Institute was established in 2008 to study how broadband, the media industry and emerging communications technologies can become avenues of advancement for people of color. For the past seven years, Dr. Turner-Lee has been an executive at One Economy - a global nonprofit that uses the power of technology and information to expand opportunities for low-income people – serving most recently as Senior Vice President for External Affairs in charge of public relations, national strategic partnerships and business development. While at One Economy, Dr. Turner-Lee played key roles in all aspects of its core business, including residential and community broadband access, online public purpose media and youth technology training. She helped to establish broadband connections in thousands of affordable housing units, supported the development and distribution of One Economy's core media properties and expanded a national technology service initiative from 250 to nearly 3,000 youth in less than two years. Before joining One Economy, Dr. Turner-Lee founded the Neighborhood Technology Resource Center, a Chicago-based nonprofit that provided public access to computers and the Internet to thousands of low- and middle-income people. Dr. Turner-Lee serves on the board of the Center for Economic Progress, most recently as its vice chairperson. She is a member of the board for the Community Renewal Society, and TPRC. She is also former member of the Chicago Wireless Task Force. In 2007, Broadband Properties magazine named her to its list of the "Top 10 National Broadband Promoters." Dr. Turner-Lee is a former Research Fellow with Northwestern University's Asset-Based Community Development Institute, a Rockwood Leadership Fellow and has served as adjunct faculty at Northwestern and North Park Universities. She graduated with honors from Colgate University, has a doctorate in Sociology from Northwestern University and a Certificate in Nonprofit Management from the University of Illinois-Chicago.

SAMIR GAMBHIR, SENIOR RESEARCH ASSOCIATE (GIS), KIRWAN INSTITUTE FOR THE STUDY OF RACE AND ETHNICITY, THE OHIO STATE UNIVERSITY

Samir works as a Senior Research Associate for the Institute. He leads the GIS Mapping work for Institute's Opportunity Communities Initiative. He has been involved in research projects at the Institute focusing on social equity issues and covering a wide array of topics such as education, health, housing to name a few. His work involves spatial and quantitative analysis for research projects at the Institute. He is leading Institute's transition to web-based interactive mapping platform. He manages and maintains Kirwan Institute's ESRI suite of GIS software. Before joining the institute, Samir worked as a GIS Intern with Dispatch Consumer Services and was a teaching assistant for GIS courses at The Ohio State University. He completed his masters in City and Regional Planning from The Ohio State University in 2003.

MIKYUNG BAEK, PH.D., RESEARCH AND TECHNICAL ASSOCIATE, KIRWAN INSTITUTE FOR THE STUDY OF RACE AND ETHNICITY, THE OHIO STATE UNIVERSITY

Dr. Baek works as a Research & Technical Associate for Kirwan Institute for the Study of Race and Ethnicity at The Ohio State University. Her research areas are technology, education and gender with emphasis on digital inequality and technology for social inclusion. One of the analytical lenses she employs is Opportunity Mapping, a spatial analysis tool to quantify, map and visualize the opportunity structures which exist throughout neighborhoods, cities, regions and states. Before joining Kirwan Institute in 2005, Dr. Baek worked as a network manager for six years in South Korea before coming to the U.S. She received her Ph.D. in Educational Technology and M.A. in Foreign and Second Language Education, both from The Ohio State University and earned her B.S. in Computer Science and Statistics from South Korea. With her interdisciplinary academic and professional background, Dr. Baek is also involved in development and maintenance of the institute's web sites and other multimedia communication channels and assistance with the institute's technical issues.

Appendix A

Race, Ethnicity, Income and Broadband Provider in South Carolina, Chicago and Los Angeles

TABLE 1

Race, Ethnicity, Income and Broadband Provider by County in South Carolina

	Total population	White (%)	Black (%)	Asian (%)	Hispanic (%)	Median household income	Number of broadband providers	Wireline	Wireless by 100% coverage
South Carolina	4,416,867	65.1	28.1	1.2	4	$43,572	42	42	0
Abbeville County	25,347	69.3	28.6	0.1	1.1	$33,495	8	8	0
Aiken County	152,647	68.8	25.4	0.7	3.6	$44,534	7	7	0
Allendale County	10,459	25.8	69.0	0.0	4.5	$20,551	3	3	0
Anderson County	179,914	79.5	15.9	0.6	2.0	$43,109	5	5	0
Bamberg County	15,384	36.3	61.8	0.3	1.3	$30,889	5	5	0
Barnwell County	22,914	53.2	44.3	0.0	1.7	$35,888	3	3	0
Beaufort County	147,799	67.5	20.3	1.0	9.7	$54,131	7	7	0
Berkeley County	163,328	65.3	25.9	2.2	3.8	$49,286	8	8	0
Calhoun County	14,746	52.2	43.6	0.3	2.0	$37,402	5	5	0
Charleston County	345,714	62.4	30.9	1.5	3.7	$47,770	7	7	0
Cherokee County	54,175	74.9	20.2	0.6	3.0	$34,808	4	4	0
Chester County	32,666	58.9	37.5	0.2	1.2	$31,964	6	6	0
Chesterfield County	42,876	62.1	33.3	0.4	3.3	$33,968	5	5	0
Clarendon County	32,863	46.2	50.2	0.1	2.5	$31,761	3	3	0
Colleton County	39,128	55.6	40.5	0.2	2.3	$34,135	5	5	0
Darlington County	66,771	55.4	41.4	0.3	1.4	$38,753	4	4	0
Dillon County	30,777	47.9	45.4	0.1	3.0	$27,588	2	2	0
Dorchester County	122,442	67.9	25.1	1.4	3.2	$54,139	5	5	0
Edgefield County	25,469	56.4	39.7	0.3	2.8	$44,391	6	6	0

Fairfield County	23,482	40.7	56.3	0.1	1.3	$32,120	4	4	0
Florence County	132,153	56.2	39.9	1.0	1.6	$41,142	5	5	0
Georgetown County	60,235	62.4	33.7	0.4	2.8	$42,283	5	5	0
Greenville County	430,273	71.5	17.8	2.0	7.1	$46,671	6	6	0
Greenwood County	68,631	61.9	30.5	1.3	4.9	$39,801	4	4	0
Hampton County	20,997	41.0	54.2	0.4	3.2	$34,285	4	4	0
Horry County	248,601	78.7	14.2	1.1	4.5	$42,642	4	4	0
Jasper County	22,250	38.2	46.3	0.4	12.6	$36,288	4	4	0
Kershaw County	58,176	69.7	26.0	0.3	2.6	$45,035	8	8	0
Lancaster County	73,725	69.1	25.8	0.5	3.4	$38,590	9	9	0
Laurens County	69,697	70.0	24.7	0.3	3.4	$38,816	6	6	0
Lee County	20,074	34.2	61.2	0.0	3.7	$24,847	5	5	0
Lexington County	244,348	79.0	14.1	1.3	3.8	$51,983	5	5	0
McCormick County	10,087	50.1	48.0	0.2	0.4	$34,786	4	4	0
Marion County	34,023	40.8	55.5	0.1	3.2	$29,626	2	2	0
Marlboro County	28,571	42.1	50.7	0.3	1.6	$26,002	2	2	0
Newberry County	37,992	59.7	29.7	0.3	8.5	$41,080	6	6	0
Oconee County	70,507	86.9	8.0	0.4	3.7	$41,095	3	3	0
Orangeburg County	90,387	35.4	61.5	0.5	1.4	$32,132	10	10	0
Pickens County	116,092	87.8	6.6	1.4	2.9	$41,969	3	3	0
Richland County	359,144	46.8	44.9	2.2	3.9	$47,969	4	4	0
Saluda County	18,947	58.1	26.4	0.0	14.3	$41,510	6	6	0
Spartanburg County	276,544	71.4	20.6	1.8	5.0	$42,349	7	7	0
Sumter County	104,441	48.0	47.0	1.3	2.5	$37,752	4	4	0
Union County	27,800	66.8	30.8	0.0	0.9	$33,345	4	4	0
Williamsburg County	34,920	31.5	66.2	0.1	1.1	$25,948	4	4	0
York County	209,351	74.0	18.7	1.3	3.8	$51,332	9	9	0

Source: U.S. Census Bureau, 2005-2009 American Community Survey and NTIA's State Broadband Data and Development (SBDD) Program

TABLE 2

Percentage of People Living in Areas with Wireline and Wireless Providers by County in South Carolina

	Number of Wireline Providers									Number of Wireless Providers								
	0	1	2	3	4	5	6	7	8+	0	1	2	3	4	5	6	7	8+
South Carolina	7.8	20.5	66.6	5.1	0.1	0	0	0	0	0.2	7.9	20.7	45.2	22.8	3.2	0	0	0
Abbeville County	0.8	26.6	62.9	7.3	2.4	0	0	0	0	0.5	22.2	69.1	6.9	1.3	0	0	0	0
Aiken County	5.1	20.9	72.2	1.9	0	0	0	0	0	0.4	5.6	19.2	74.8	0	0	0	0	0
Allendale County	27.3	33.4	39.3	0	0	0	0	0	0	10.8	89.2	0	0	0	0	0	0	0
Anderson County	2.3	13.7	75.4	8.7	0	0	0	0	0	0	1.3	38	60.7	0	0	0	0	0
Bamberg County	34.6	23.8	41.6	0	0	0	0	0	0	5.9	94.1	0	0	0	0	0	0	0
Barnwell County	15.4	22	62.6	0.1	0	0	0	0	0	2.9	57.2	40	0	0	0	0	0	0
Beaufort County	1.1	19.3	74.1	5.5	0	0	0	0	0	0	0.7	6.4	90.3	2.6	0	0	0	0
Berkeley County	1.8	38.8	48.9	10.5	0	0	0	0	0	0	17	4.8	15.1	63.2	0	0	0	0
Calhoun County	55.5	27.7	15.7	1.1	0	0	0	0	0	1.9	30	51.5	16.6	0	0	0	0	0
Charleston County	3.6	9.7	86.1	0.7	0	0	0	0	0	0	0.2	7.3	4.3	88.3	0	0	0	0
Cherokee County	9.9	20.1	68.7	1.3	0	0	0	0	0	0	0.8	98.8	0.3	0	0	0	0	0
Chester County	1.7	86.2	8.5	3.7	0	0	0	0	0	0.8	34.7	64.4	0	0	0	0	0	0
Chesterfield County	5.1	71	23.9	0	0	0	0	0	0	0.8	59.9	36.7	2.6	0	0	0	0	0
Clarendon County	0	62.9	31.4	5.7	0	0	0	0	0	0	28.2	59.9	11.4	0	0	0	0	0
Colleton County	2.2	54.7	42.9	0.2	0	0	0	0	0	0	19.3	78.6	2	0	0	0	0	0
Darlington County	8.5	16.2	74.9	0.3	0	0	0	0	0	0	8.2	41	40.1	10.7	0	0	0	0
Dillon County	13.9	23.6	62.5	0	0	0	0	0	0	0	0	19.2	80.8	0	0	0	0	0
Dorchester County	13.4	21.2	55.3	10.1	0	0	0	0	0	0	2.6	19.1	12.2	66.1	0	0	0	0
Edgefield County	25.9	48.8	25.3	0	0	0	0	0	0	3.1	27.3	56.1	13.5	0	0	0	0	0
Fairfield County	37.1	62.1	0.6	0.2	0	0	0	0	0	2.7	55.1	36	6.2	0	0	0	0	0
Florence County	4.5	13.5	73.1	8.5	0.4	0.1	0	0	0	0.1	17.1	15.8	13.1	53.9	0	0	0	0

Georgetown County	12.6	27.6	28.8	30.4	0.7	0	0	0	0	1.8	27.5	55.2	4.5	11.1	0	0	0	0
Greenville County	0.8	6	91.6	1.6	0	0	0	0	0	0	0.1	6.4	89.8	3.7	0	0	0	0
Greenwood County	0.9	9.2	85.2	4.8	0	0	0	0	0	0	0.5	86.8	12.7	0	0	0	0	0
Hampton County	25	54	21	0	0	0	0	0	0	0	11.6	79.7	8.7	0	0	0	0	0
Horry County	36.2	33.9	15.6	14.3	0	0	0	0	0	0	1.9	3.4	8.2	86.5	0	0	0	0
Jasper County	10.7	88.3	1	0	0	0	0	0	0	0	3.1	11.9	84.2	0.8	0	0	0	0
Kershaw County	10.2	22.2	57.2	10.5	0	0	0	0	0	0.1	19.5	45.6	34.8	0	0	0	0	0
Lancaster County	2.6	13.1	76.6	7.8	0	0	0	0	0	0.3	26.9	9.6	11.4	10.7	41.2	0	0	0
Laurens County	4.4	22.4	68.8	4.4	0	0	0	0	0	0	0	0.4	13.4	86.2	0	0	0	0
Lee County	2.9	62	33	2.1	0	0	0	0	0	0	26.5	69.9	3.5	0	0	0	0	0
Lexington County	1.8	18.2	69	10.1	0.9	0	0	0	0	0	1.2	4	94.5	0.3	0	0	0	0
Marion County	22.5	25.2	52.3	0	0	0	0	0	0	0	2.6	20.9	74.5	2	0	0	0	0
Marlboro County	20.5	21.1	58.4	0	0	0	0	0	0	0	53.5	42.5	4	0	0	0	0	0
McCormick County	0.1	94.8	5.1	0	0	0	0	0	0	2.6	14.7	82.6	0.1	0	0	0	0	0
Newberry County	25.4	15.7	58.7	0.3	0	0	0	0	0	0	15.3	68	15.9	0.8	0	0	0	0
Oconee County	9.9	31.8	54.7	3.7	0	0	0	0	0	0.8	3.8	83.6	11.8	0	0	0	0	0
Orangeburg County	22.1	42.4	35.2	0.3	0	0	0	0	0	1.3	11.4	42	45.3	0	0	0	0	0
Pickens County	2.1	12	76.3	9.6	0	0	0	0	0	0	2.1	25	71.5	1.4	0	0	0	0
Richland County	7	15	77.9	0.1	0	0	0	0	0	0	1	1.4	97.5	0	0	0	0	0
Saluda County	14.6	66.5	18.9	0	0	0	0	0	0	0.4	53.8	35.8	10	0	0	0	0	0
Spartanburg County	2.1	7.9	87.2	2.8	0	0	0	0	0	0	0.1	9.6	89	1.4	0	0	0	0
Sumter County	2.1	16.2	76	5.7	0	0	0	0	0	0.1	2.5	3.6	9.9	83.9	0	0	0	0
Union County	16.3	22.5	61.3	0	0	0	0	0	0	0.2	14.2	84.4	0.9	0.3	0	0	0	0
Williamsburg County	15	41	30.4	11.5	2.2	0	0	0	0	0.4	74	25.6	0	0	0	0	0	0
York County	3.6	5.7	87	3.6	0.2	0	0	0	0	0.1	3.9	21.3	10.7	12	52.1	0	0	0

Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

TABLE 3

Race, Ethnicity, Income and Broadband Provider by City in Los Angeles-Long Beach-Santa Ana Metro Area

	Total population	White (%)	Black (%)	Asian (%)	Hispanic (%)	Median household income	Number of broadband providers	Wireline	Wireless By 100% coverage
Los Angeles Metro	12,762,126	33.1	6.9	13.6	44.0	$58,987	18	17	1
Alhambra city	84,959	11.7	1.4	50.1	34.9	$52,296	8	8	0
Anaheim city	331,702	29.5	2.6	13.4	52.3	$57,870	7	7	0
Arcadia city	55,608	30.2	0.9	54.7	11.9	$78,273	9	9	0
Baldwin Park city	77,057	5.9	0.7	11.4	80.7	$50,732	6	6	0
Buena Park city	78,689	30.2	4.2	23.8	39.3	$62,006	6	6	0
Burbank city	102,364	60.0	2.4	9.9	25.3	$62,255	8	7	1
Carson city	92,124	7.6	24.2	23.7	38.7	$68,818	10	9	1
Cerritos city	51,215	17.3	7.8	59.6	11.3	$86,497	8	8	0
Compton city	93,621	0.8	34.5	0.4	61.9	$41,890	7	7	0
Costa Mesa city	108,787	53.7	1.1	8.7	33.6	$62,303	10	9	1
Diamond Bar city	56,839	24.4	3.5	50.2	19.6	$89,185	6	6	0
Downey city	107,178	19.7	3.6	7.4	67.9	$58,128	7	7	0
El Monte city	120,960	5.1	0.8	23.6	69.8	$41,948	8	8	0
Fullerton city	131,225	39.8	3.1	22.2	32.1	$66,189	8	8	0
Gardena city	58,359	10.2	24.0	26.2	36.5	$45,901	8	8	0
Garden Grove city	164,530	24.3	1.0	32.8	39.7	$59,761	7	7	0
Glendale city	195,876	63.0	1.9	15.8	17.8	$54,163	9	9	0
Hawthorne city	83,781	12.2	28.0	5.9	51.6	$44,052	6	6	0
Huntington Beach city	191,835	69.2	0.6	9.8	17.3	$80,000	6	6	0
Inglewood city	112,279	3.5	42.6	1.2	50.4	$42,235	8	7	1
Irvine city	197,498	49.7	1.7	36.2	9.0	$92,195	8	8	0

Lake Forest city	75,285	60.2	1.8	11.8	22.7	$91,389	6	6	0
Lakewood city	78,303	43.8	7.1	16.2	28.0	$76,348	7	7	0
Lancaster city	140,409	37.3	17.9	4.4	36.5	$49,567	7	7	0
Long Beach city	462,823	30.0	13.3	12.6	40.0	$50,040	10	9	1
Los Angeles city	3,796,840	29.3	9.5	10.5	48.5	$48,570	13	12	1
Mission Viejo city	93,980	71.5	1.1	8.4	15.5	$94,333	6	6	0
Montebello city	61,711	9.7	1.1	9.9	78.2	$51,449	9	8	1
Newport Beach city	80,629	83.5	0.6	6.9	7.2	$107,500	9	8	1
Norwalk city	102,910	13.7	5.1	12.9	67.1	$59,070	7	7	0
Orange city	134,358	48.1	1.6	10.3	38.0	$76,669	9	9	0
Palmdale city	138,595	27.4	13.4	4.0	52.8	$54,840	8	8	0
Paramount city	55,106	7.5	10.6	2.1	78.3	$42,588	7	7	0
Pasadena city	142,013	40.2	11.3	12.2	33.6	$62,242	9	9	0
Pomona city	151,552	12.8	7.6	7.0	70.8	$49,661	7	7	0
Redondo Beach city	66,185	68.2	2.5	10.5	15.0	$92,365	6	6	0
Santa Ana city	336,988	10.2	1.1	8.8	78.6	$54,521	7	7	0
Santa Clarita city	168,538	58.1	2.6	6.9	28.2	$82,602	5	5	0
Santa Monica city	86,659	72.2	3.4	8.9	12.0	$67,062	7	6	1
South Gate city	96,360	4.0	0.2	0.7	94.7	$42,556	7	7	0
Torrance city	139,976	44.0	2.4	32.8	16.5	$73,606	8	7	1
Tustin city	70,142	39.5	2.4	19.3	35.9	$70,247	9	8	1
West Covina city	105,547	17.8	5.3	22.9	52.3	$66,589	7	7	0
Westminster city	88,618	29.8	1.0	43.5	23.3	$58,846	7	7	0
Whittier city	82,169	30.1	0.7	3.1	64.5	$64,973	5	5	0
Yorba Linda city	64,729	69.1	2.1	12.1	13.2	$114,332	6	6	0

Source: U.S. Census Bureau, 2005-2009 American Community Survey and NTIA's State Broadband Data and Development (SBDD) Program

TABLE 4

Percentage of People Living in Areas with Wireline and Wireless Providers by City in Los Angeles-Long Beach-Santa Ana Metro Area

	Number of Wireline Providers									Number of Wireless Providers								
	0	1	2	3	4	5	6	7	8+	0	1	2	3	4	5	6	7	8+
Los Angeles Metro	1.1	19.5	64.4	14.3	0.6	0	0	0	0	0.1	0	0.1	0.5	47.6	51.7	0	0	0
Alhambra city	0	4.2	92.7	3.1	0	0	0	0	0	0	0	0	0	88.5	11.5	0	0	0
Anaheim city	0.7	9.5	67.4	21.6	0.8	0	0.1	0	0	0	0	0	0	2.8	97.2	0	0	0
Arcadia city	0.6	4.8	46.7	45.2	2.8	0	0	0	0	0	0	0	0	92.6	7.5	0	0	0
Baldwin Park city	0.2	10.6	55.1	33.2	0.9	0	0	0	0	0	0	0	0	99.9	0.1	0	0	0
Buena Park city	2.7	46.3	50.5	0.5	0	0	0	0	0	0	0	0	0	4.7	95.3	0	0	0
Burbank city	0	5.5	90.5	3.6	0.2	0	0	0	0	0	0	0	0	95.8	4.2	0	0	0
Carson city	0.3	32.3	64.2	3.2	0	0	0	0	0	0	0	0	0	32	68	0	0	0
Cerritos city	0	10.3	84.2	5.5	0	0	0	0	0	0	0	0	0	20.9	79.2	0	0	0
Compton city	0	17.8	63.3	18.8	0.1	0	0	0	0	0	0	0	0	84.9	15.2	0	0	0
Costa Mesa city	0.2	28.1	68.8	2.1	0.8	0	0	0	0	0	0	0	0	97.9	2.1	0	0	0
Diamond Bar city	3.1	45.6	49.2	2.1	0	0	0	0	0	0	0	0	0.1	43.6	56.3	0	0	0
Downey city	0.2	21.3	72.7	5.5	0.3	0	0	0	0	0	0	0	0	0	100	0	0	0
El Monte city	0.5	13.4	49	36	1.2	0	0	0	0	0	0	0	0	99.9	0.1	0	0	0
Fullerton city	0.1	29.5	68.8	1.6	0	0	0	0	0	0	0	0	0	37.6	62.4	0	0	0
Gardena city	2.9	35.4	58.2	3.5	0	0	0	0	0	0	0	0	0	14.8	85.2	0	0	0
Garden Grove city	1.1	19.2	73.8	4.7	1.3	0	0	0	0	0	0	0	0	75	25	0	0	0
Glendale city	0.1	5.6	90.1	4.3	0	0	0	0	0	0	0	0	0	83.8	16.2	0	0	0
Hawthorne city	1.6	21.7	50.4	26.3	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Huntington Beach city	1.1	30.2	66.3	1.6	0.8	0	0	0	0	0.9	0	0	0	99.1	0	0	0	0
Inglewood city	1.6	24.2	50.3	23.9	0	0	0	0	0	0	0	0	0	0.8	98.6	0.6	0	0
Irvine city	4.3	51.1	42.8	1.6	0.1	0	0	0	0	0	0	0	0	80.9	19.1	0	0	0
Lake Forest city	1.4	44.4	46.8	6.2	1.2	0	0	0	0	0	0	0	0	82.7	17.3	0	0	0

Lakewood city	1.3	16	77.2	5.5	0	0	0	0	0	0	0	0	0	100	0	0	0	0
Lancaster city	5.5	27.4	65.9	1.2	0	0	0	0	0	0	0	0	2	98	0	0	0	0
Long Beach city	0	3.4	82.4	13.8	0.4	0	0	0	0	0.6	0	0	0	90.9	8.4	0	0	0
Los Angeles city	0.5	12.1	64.2	22.5	0.8	0	0	0	0	0	0	0	0.2	39.9	59.8	0	0	0
Mission Viejo city	2.6	41.8	53.8	1.1	0.8	0	0	0	0	0	0	0	0	78.7	21.3	0	0	0
Montebello city	0	7.9	72.8	17.1	2.3	0	0	0	0	0	0	0	0	1.9	98	0.2	0	0
Newport Beach city	7.6	41.9	41	8.2	1.2	0	0	0	0	6.9	0	0	8.4	84.7	0	0	0	0
Norwalk city	0	3.2	84.7	11	1.1	0	0	0	0	0	0	0	0	0	100	0	0	0
Orange city	1.6	24	66.9	7.3	0	0.2	0	0	0	0	0	0	0	0	100	0	0	0
Palmdale city	1.2	26.1	71.7	1	0	0	0	0	0	0	0	0.1	0.1	99.8	0	0	0	0
Paramount city	2.2	28	44.4	24.7	0.8	0	0	0	0	0	0	0	0	42.8	57.2	0	0	0
Pasadena city	0	16.5	78.6	4.4	0.5	0	0	0	0	0	0	0	0	58.1	41.9	0	0	0
Pomona city	2.1	10.9	66.9	20	0.2	0	0	0	0	0	0	0	0	82.1	17.9	0	0	0
Redondo Beach city	0	3.2	91.8	5	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Santa Ana city	0.7	17.8	60.3	21	0.3	0	0	0	0	0	0	0	0	80.9	18.7	0.4	0	0
Santa Clarita city	1.8	31.8	66	0.4	0	0	0	0	0			0.1	2.8	95.4	1.7	0	0	0
Santa Monica city	0	58.6	39.2	1.9	0.1	0.1	0.1	0	0	0	0	0	0	0.8	99.2	0	0	0
South Gate city	1	19.1	35.7	44.2	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Torrance city	2.6	37.9	56.9	2.6	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Tustin city	1.7	47.1	46.3	4.8	0	0.1	0	0	0	0	0	0	0	51.4	48.6	0	0	0
West Covina city	0	10.7	81.1	8.3	0	0	0	0	0	0	0	0	0	27.4	72.6	0	0	0
Westminster city	0.4	25.9	71.9	1.9	0	0	0	0	0	0	0	0	0	100	0	0	0	0
Whittier city	0	4.3	89.1	6.6	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Yorba Linda city	0.4	32.8	64.1	2.8	0	0	0	0	0	0	0	0.1	0	7.8	92.1	0	0	0

Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

TABLE 5

Race, Ethnicity, Income and Broadband Provider by City in Chicago-Naperville-Joliet, IL-IN-WI Metro Area

	Total population	White (%)	Black (%)	Asian (%)	Hispanic (%)	Median household income	Number of broadband providers	Wireline	Wireless By 100% coverage
Chicago Metro	9,461,816	56.7	17.5	5.1	19.2	$60,289	3	3	0
Arlington Heights village	73,334	85.4	0.9	7.2	5.2	$78,765	2	2	0
Chicago city	2,824,064	32.5	33.8	4.9	27.4	$46,781	3	3	0
Des Plaines city	56,316	70.7	1.4	11.6	15.1	$60,574	2	2	0
Elgin city	102,590	46.8	6.3	4.5	40.5	$57,009	2	2	0
Evanston city	76,599	63.8	18.3	7.2	7.6	$69,544	3	3	0
Hoffman Estates village	54,393	61.8	4.3	19.0	13.3	$76,171	2	2	0
Joliet city	143,008	52.4	16.8	2.0	26.7	$56,817	2	2	0
Naperville city	141,644	76.6	3.7	13.2	5.0	$100,503	2	2	0
Schaumburg village	70,698	70.4	3.1	16.9	7.6	$68,594	2	2	0
Skokie village	66,170	63.2	6.2	22.3	5.7	$66,916	3	3	0

Source: U.S. Census Bureau, 2005-2009 American Community Survey and NTIA's State Broadband Data and Development (SBDD) Program

TABLE 6

Percentage of People Living in Areas with Wireline and Wireless Providers by City in Chicago-Naperville-Joliet, IL-IN-WI Metro Area

	Number of Wireline Providers									Number of Wireless Providers								
	0	1	2	3	4	5	6	7	8+	0	1	2	3	4	5	6	7	8+
Chicago Metro	0	2.6	86.2	10	1	0	0	0	0	0	0	1	0	7	5.9	56.7	11.8	17.7
Arlington Heights village	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	75	25	0
Chicago city	0	0.1	77.7	22.2	0	0	0	0	0	0	0	0	0	0	0	100	0	0
Des Plaines city	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
Elgin city	0	0.4	99.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	99.3
Evanston city	0	0	87.6	12.4	0	0	0	0	0	0	0	0	0	31.1	0.4	68.5	0	0
Hoffman Estates village	0	1.1	98.9	0	0	0	0	0	0	0	0	0	0	0	0	24.5	28.8	46.8
Joliet city	0	0.1	99.9	0	0	0	0	0	0	0	0	0	0	0	0.9	38.7	20.6	39.9
Naperville city	0	0.3	99.7	0	0	0	0	0	0	0	0	0	0	0	0	0.6	23.9	75.6
Schaumburg village	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	6.2	40.2	53.6
Skokie village	0	0	0.1	99.9	0	0	0	0	0	0	0	0	0	0	1.6	98.4	0	0

Source: NTIA's State Broadband Data and Development (SBDD) Program at http://www.broadbandmap.gov/

Appendix B
Broadband Providers

Broadband Providers in the State of South Carolina (42 providers*)*

1. Atlantic Broadban
2. BellSouth Telecom
3. Bluffton Telephon
4. Carolina Telcom
5. Catawba Services
6. CenturyLink
7. Charter Communica
8. Chesnee Cable, In
9. Chesnee Telephone
10. Chester Telephone
11. Comcast Cable Com
12. Fairfield Communi
13. Farmers Telephone
14. Fort Mill Telepho
15. Frontier Communic
16. FTC Diversified S
17. Hargray Telephone
18. Home Telecom
19. Home Telephone Co
20. HTC Communication
21. Lancaster Telepho
22. McClellanville Te
23. MetroCast Communi
24. Northland Cable T
25. Norway Telephone
26. Palmetto Cable TV
27. Palmetto Rural Te
28. Palmetto Telephon
29. PBT Communication
30. PBT Telecom, Inc.
31. Piedmont Rural Te
32. Rock Hill Telepho
33. Sandhill Telephon
34. Southern Coastal
35. St. Stephen Telep
36. Techcore Consulta
37. Time Warner Cable

38. Video Vision
39. West Carolina Com
40. West Carolina Rur
41. Williston Telepho
42. Windstream South

Broadband Providers in Los Angeles MSA, CA (18 providers)

1. CBC Broadband Hol
2. CHARTER COMMUNICA
3. Comcast Cable Com
4. CoxCom Inc.
5. ELECTRIC LIGHTWAV
6. Golden Rain Found
7. New Edge Network
8. Nextlink Wireless
9. PACIFIC BELL TELE
10. PAETEC Communicat
11. Race Internet Inc
12. Ralph J Morrow Jr
13. Smart Resort
14. Telscape Communic
15. TIME WARNER CABLE
16. tw telecom of cal
17. Verizon Californi
18. XO Communications

Broadband Providers in Chicago MSA, IL-IN-WI (33 providers)

1. Airbaud
2. CenturyLink
3. CHARTER COMMUNICA
4. Comcast
5. Comcast Cable Com
6. CSInet Internet A
7. DIECA Communicati
8. Embarq
9. Fairnet LLC
10. Frontier North
11. Heartland Cable B
12. Illinois Bell Tel
13. Indiana Bell Tele

14. Insight Communica
15. IQuest Internet
16. Kankakee Valley R
17. Kraus Electronics
18. Level 3 Communica
19. Mediacom Illinois
20. Mediacom Indiana
21. Midway Net
22. Midwest Telecom o
23. Monon Telephone C
24. NetNITCO
25. Northwest Indiana
26. Pulaski White Rur
27. RCN Telecom Servi
28. Smart Band Networ
29. Time Warner Cable
30. TLS.net, Inc
31. tw telecom of wis
32. Verizon
33. Wisconsin Bell, I

Appendix C
List of Broadband Maps

Maps for the state of South Carolina

- *SC1: Broadband Access and Population Density*
- *SC2: Broadband Access and Median Household Income*
- *SC3: Broadband Access and Non-White Population*
- *SC4: Broadband Access and African American Population*

Maps for the *northern part* of South Carolina

- *SC-N1: Broadband Access and Population Density*
- *SC-N2: Broadband Access and Median Household Income*
- *SC-N3: Broadband Access and Non-White Population*
- *SC-N4: Broadband Access and African American Population*

Maps for the *southern part* of South Carolina

- *SC-S1: Broadband Access and Population Density*
- *SC-S2: Broadband Access and Median Household Income*
- *SC-S3: Broadband Access and Non-White Population*
- *SC-S4: Broadband Access and African American Population*

Maps for Los Angeles Metro area:

- *LA1: Broadband Access and Population Density*
- *LA2: Broadband Access and Median Household Income*
- *LA3: Broadband Access and Non-White Population*
- *LA4: Broadband Access and African American Population*
- *LA5: Broadband Access and Hispanic Population*
- *LA6: Broadband Access and Asian Population*

Maps for Chicago Metro area - "A" Series for the larger range of service providers

- *CH A1: Broadband Access and Population Density*
- *CH A2: Broadband Access and Median Household Income*
- *CH A3: Broadband Access and Non-White Population*
- *CH A4: Broadband Access and African American Population*

Maps for Chicago Metro area - "B" Series for the smaller range of service providers

- *CH B1: Broadband Access and Population Density*
- *CH B2: Broadband Access and Median Household Income*
- *CH B3: Broadband Access and Non-White Population*
- *CH B4: Broadband Access and African American Population*

Appendix D
OLS results for State of South Carolina

		Model #1	Model #2	Model #3	Model #4	Model #5	Model #6	Model #7	Model #8	Model #9	Model #10
Dependent variable	**Total number of broadband providers**										
Indep. Var. 1	Percentage non-Whites	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	Sig, -ve coeff.	
Indep. Var. 2	Median Household Income		Sig, +ve coeff.	non-Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.	Sig, +ve coeff.
Indep. Var. 3	Population density			Sig, -ve coeff.	non-Sig, +ve coeff.						
Indep. Var. 4	Urban dummy (1=Urban)				non-Sig, +ve coeff.	non-Sig, +ve coeff.		non-Sig, +ve coeff.			
Indep. Var. 5	Wireline providers as a percentage of Wireless providers				non-Sig, -ve coeff.	non-Sig, -ve coeff.	non-Sig, -ve coeff.				

Indep. Var. 6	Wireless dummy (1= Percentage of wirless providers greater than wireline providers)							non-Sig, +ve coeff.	non-Sig, +ve coeff.		
Indep. Var. 7	Wireline providers per capita									Sig, +ve coeff.	
Indep. Var. 8	Wireline providers per non-white population										non-Sig, +ve coeff.
Adjusted R-square		**0.022**	**0.039**	**0.057**	**0.037**	**0.038**	**0.038**	**0.038**	**0.038**	**0.044**	**0.037**

Appendix E
Map of Inglewood, CA by Broadband Speed

Map LA4-2: Broadband Speed and African American Population

Inglewood, California

This map displays the maximum advertised download speed of broadband service available in Inglewood, California denoted by the number of broadband providers, overlaid on the African American percentage of the total population.

Data Sources: NTIA's State Broadband Data and Development (SBDD) Program, ESRI BA 2010 | **Date:** March 11, 2011